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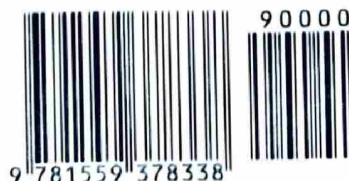
# **The IEEE Standard Dictionary of Electrical and Electronics Terms**

**Sixth Edition**

**Standards Coordinating Committee 10, Terms and Definitions  
Jane Radatz, Chair**

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

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## How to use this dictionary

The terms defined in this dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cab signal*. Descriptive categories associated with the term in earlier editions of IEEE Std 100 will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter s, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter w, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Acronyms and abbreviations are no longer listed in a separate section in the dictionary; rather, they are incorporated alphabetically with other terms. Each acronym or abbreviation refers to its expanded term, where it is defined. Acronyms and abbreviations for which no definition was included in past editions have been deleted from this edition of IEEE Std 100.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at <http://standards.ieee.org/>.

## Categories

The category abbreviations that are used in this edition of IEEE Std 100 are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category "Std100" assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.



conforms to manufacturer's recommendations.

(NEC/NESC) [86]

**controller (1) (electric pipe heating systems)** A device that regulates the state of a system by comparing a signal from a sensor located in the system with a predetermined value and adjusting its output to achieve the predetermined value. Controllers, as used in electric pipe heating systems, regulate temperatures on the system and can be referred to as temperature controllers or thermostats. Controller sensors can be mechanical (bulb, bimetallic) or electrical (thermocouple, resistance-temperature detector [RTD] thermistor).

(PE) 622A-1984r, 622B-1988r

(2) A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. (NEC/NESC) [86]

(3) **(packaging machinery)** A device or group of devices that serves to control in some predetermined manner the apparatus to which it is connected. (IA) 333-1980w

(4) The component of a system that functions as the system controller. A controller typically sends program messages to and receives response messages from devices.

(IM) 488.2-1992

(5) (A) A functional unit in a computer system that controls one or more units of the peripheral equipment. *Synonym:* peripheral control unit. *See also:* dual-channel controller; input-output controller. (B) In robotics, a processor that takes as input desired and measured position, velocity or other pertinent variables and whose output is a drive signal to a controlling motor or activator. (C) A device through which one can introduce commands to a control system.

(C) 610.10-1994

(6) The entity that initiates RamLink transactions. There is exactly one controller on each RamLink ringlet.

(C/MM) 1596.4-1996

(7) **(CAMAC system)** *See also:* CAMAC crate.

(8) *See also:* SBus Controller. (BA/C) 1496-1993

**Controller** *See:* SBus Controller.

**controller, automatic (process control)** A device that operates automatically to regulate a controlled variable in response to a command and a feedback signal. *Note:* The term originated in process control usage. Feedback elements and final control elements may also be part of the device. *See also:* control system, feedback. (PE) [3]

**controller characteristics (thyristor)** The electrical characteristics of an ac power controller measured or observed at its input or output terminal. (IA) 428-1981w

**controller current (thyristor)** The current flowing through the terminals of the controller. (IA) 428-1981w

**controller diagram (electric-power devices)** A diagram that shows the electric connections between the parts comprising the controller and that shows the external connections. (IA) [60], 270-1966w

**controller equipment (thyristor)** An operative unit for ac power control comprising one or more thyristor assemblies together with any input or output transformers, filters, other switching devices and auxiliaries required by the thyristor ac power controller to function. (IA) 428-1981w

**controller faults (thyristor)** A fault condition exists if the conduction cycles of some semiconductors are abnormal.

(IA) 428-1981w

**controller ON-state interval (thyristor)** The time interval in which the controller conducts. *Note:* It is assumed that the starting instant of the controller ON-state interval is coincident with the starting instant of the trigger pulse.

(IA) 428-1981w

**controller power transformer (thyristor)** A transformer within the controller employed to provide isolation or the transformation of voltage or current, or both.

(IA) 428-1981w

**controller section (thyristor)** That part of a controller circuit containing the basic control elements necessary for controlling the load voltage. (IA) 428-1981w

**controller, self-operated (automatic control)** A control device in which all the energy to operate the final controlling element is derived from the controlled system through the primary detecting element. (PE) [3]

**controllers for steel-mill accessory machines** Controllers for machines that are not used directly in the processing of steel, such as pumps, machine tools, etc. *See also:* electric controller. (IA) [60]

**controllers for steel-mill auxiliaries** Controllers for machines that are used directly in the processing of steel, such as screw-downs and manipulators but not cranes and main rolling drives. *See also:* electric controller. (IA) [60]

**controller, time schedule (process control)** A controller in which the command (or reference input signal) automatically adheres to a pre-determined time schedule. *Note:* The time schedule mechanism may be programmed to switch motors or other devices. (PE) [3]

**controlling element, final** That forward controlling element which directly changes the value of the manipulated variable. (CS/PE) [3]

**controlling elements** The functional components of a controlling system. *See also:* control system, feedback.

(IM/PE) [120], [3]

**controlling elements, forward** The elements in the controlling system that change a variable in response to the actuating signal. *See also:* control system, feedback.

(IM/PE) [120], [3]

**controlling means** (of an automatic control system) Consists of those elements that are involved in producing a corrective action. (PE) 94-1970w

**controlling section** A length of track consisting of one or more track circuit sections, by means of which the roadway elements or the device that governs approach to or movement within a block are controlled. (EEC/PE) [119]

**controlling system (1) (automatic control system without feedback)** That portion of the control system that manipulates the controlled system. (IM/PE) [120], [3]

(2) **(control system feedback)** The portion that compares functions of a directly controlled variable and a command and adjusts a manipulated variable as a function of the difference. *Note:* It includes the reference input elements; summing point; forward and final controlling elements; and feedback elements. *See also:* control system, feedback.

(IM/PE) [120], [3]

**controlling voltage, composite** *See:* composite controlling voltage.

**control machine (A) (railroad practice)** An assemblage of manually operated levers or other devices for the control of signals, switches, or other units, without mechanical interlocking, usually including a track diagram with indication lights. *See also:* car retarder. (B) **(railroad practice)** A group of levers or equivalent devices used to operate the various mechanisms and signals that constitute the car retarder installation. *See also:* car retarder; centralized traffic-control system. (EEC/PE) [119]

**control, manual** Those elements in the excitation control system which provide for manual adjustment of the synchronous machine terminal voltage by open-loop control.

(PE) 421-1972s

**control mechanism (control systems for steam turbine-generator units)** Includes all systems, devices, and mechanisms between a controller and the controlled valves.

(PE) 122-1985s

**control metering point (1) (tie line)** The location of the metering equipment that is used to measure power on the tie line for the purpose of control. *See also:* center of distribution; power system. (PE) [54]

(2) **(electric power system)** The actual or equivalent location of power flow measurement on an area tie line.

(PE) 94-1991

**control mode (thyristor)** The starting instant of the controller ON-state interval is periodic. The control mode is defined



diffusion charging

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digital link

versely with frequency, but increases as minority carrier lifetime increases and must be dealt with in many frequency multiplier and parametric amplifier designs.

(MIT) 457-1982w

**diffusion charging** Charging of aerosols by small ions in collisions resulting from thermal motion of the small ions.

(PE/T&amp;D) 539-1990

**diffusion constant (charge carrier) (homogeneous semiconductor)** The quotient of diffusion current density by the charge-carrier concentration gradient. It is equal to the product of the drift mobility and the average thermal energy per unit charge of carriers. *See also:* semiconductor.

(ED) 216-1960w

**diffusion depth** *See:* junction depth.

**diffusion length, charge-carrier (homogeneous semiconductor)** The average distance to which minority carriers diffusion length is equal to the square root of the product of the charge-carrier diffusion constant and the volume lifetime. *See also:* semiconductor.

(AE/ED/IA) [12], [41], 216-1960w, 270-1966w

**digit (1) (metric practice)** One of the ten Arabic numerals (0 to 9).

(QUL) 268-1982s

(2) (A) (notation) (positional notation) A character that stands for an integer; Loosely, the integer that the digit stands for; Loosely, any character. (B) (notation) (positional notation) A character used to represent one of the nonnegative integers smaller than the radix, for example, in decimal notation one of the characters 0 to 9.

(C) [85]

(3) (data management) (mathematics of computing) A symbol or character that represents one of the non-negative integers smaller than the radix; for example, in decimal notation, a digit is one of the characters 0 1 2 3 4 5 6 7 8 9. *Synonym:* numeric character.

(C) 1084-1986w, 610.5-1990

**digit absorption (telephone switching systems)** The interpretation and rejection of those digits received, but not required, in the setting of automatic direct control system crosspoints.

(COM) 312-1977w

**digital (1)** Pertaining to data in the form of digits. *See also:* analog.

(C) 162-1963w

(2) (mathematics of computing) Pertaining to quantities in the form of discrete, integral values. *Contrast:* analog.

(C) 1084-1986w, 610.10-1994

**digital-analog converter** *See:* digital-to-analog converter.

**digital bit rate** The number of bits per unit of time.

(COM) 1007-1991

**Digital Business Oriented Language (DIBOL)** A problem-oriented programming language developed by Digital Equipment Company; used to develop business applications. *See also:* DBL.

(C) 610.13-1993

**digital coefficient attenuator (1) (hybrid computer linkage components)** Essentially the same as a digital-to-analog multiplier (DAM). This term is generally reserved for those components that are used as the high speed hybrid replacement for manual and servo potentiometers. *Synonym:* digital potentiometer.

(C) 166-1977w

(2) A component that is used as a high-speed hybrid replacement for manual and servo potentiometers in analog computers. *Synonym:* digital potentiometer. *See also:* digital-to-analog multiplier.

(C) 610.10-1994

**Digital Command Language (DCL)** A command language used under Digital's VAX/VMS environments.

(C) 610.13-1993

**digital computer (1) (information processing)** A computer that operates on discrete data by performing arithmetic and logic processes on these data. *Contrast:* analog computer.

(C) [20], [85]

(2) (test, measurement, and diagnostic equipment) A computer in which discrete quantities are represented in digital form and which generally is made to solve mathematical problems by iterative use of the fundamental processes of

addition, subtraction, multiplication, and division.

(MIL) [2]

(3) (A) A computer that consists of one or more associated processing units and that is controlled by internally-stored programs. (B) A computer that utilizes digital circuitry to perform calculations and logical instructions, and to control sequencing of operations. *Contrast:* analog computer; hybrid computer.

(C) 610.10-1994

**Digital Control Design Language (DCDL)** A simulation language for use in designing digital computer systems.

(C) 610.13-1993

**digital controller (data processing)** A controller that accepts an input sequence of numbers and processes them to produce an output sequence of numbers.

(IM) [52]

**digital converter** A device, or group of devices, that converts an input numerical signal or code of one type into an output numerical signal or code of another type. *Synonym:* code translator.

(PE/SWG) C37.100-1992

**digital data (1) (data transmission)** Pertaining to data in the form of digits or interval quantities. *Contrast:* analog data.

(PE) 599-1985w

(2) Data in the form of discrete integral values. *Contrast:* analog data.

(C) 610.7-1995

**digital data circuit** Any circuit that transfers data in a digitally encoded form which is essential for the proper operation of the relay system.

(PE) C37.90.1-1989r

**digital device (1) (control equipment)** A device that operates on the basis of discrete numerical techniques in which the variables are represented by coded pulses or states.

(PE) 94-1970w

(2) (radio-noise emissions) An information technology equipment (ITE) that falls into the class of unintentional radiators that uses digital techniques and generates and uses timing signals or pulses at a rate in excess of 9000 pulses per second.

(EMC) C63.4-1991

**digital differential analyzer** A special-purpose digital computer consisting of many parallel computing elements, that performs integration by means of a suitable integration code on incremental quantities and that can be programmed for the solution of differential equations in a manner similar to an analog computer.

(C) 165-1977w, 610.10-1994

**digital filter** A device that produces a predetermined digital output in response to a digital input. For example, a digital filter may use arithmetic or delays in order to obtain the desired transfer function.

(C) 610.10-1994

**digital image** An image that has been converted into an array of pixels, each of which has an associated value called its gray level. *Note:* A digital image may be referred to as an image when the intended meaning is clear from the context. *Synonym:* digitized image. *See also:* digitization.

(C) 610.4-1990

**digital line link (digital line path)** A digital link that comprises a digital line section or a number of tandem-connected digital line sections.

(COM) 1007-1991

**digital line section** A digital section implemented on a single type of manufactured transmission medium, such as symmetric cable pair, coaxial, or fiber.

(COM) 1007-1991

**digital link** The method of digital transmission of a digital signal of specified rate between two digital distribution frames (or equivalent). *Notes:* 1. A digital link comprises one or more digital sections and may include multiplexing or demultiplexing, with the rule that the digital signal exiting the link must not differ in information content from the signal entering the link. 2. The term may be qualified to indicate the transmission medium used, for example, "digital satellite link." 3. The term always applies to the combination of "forward" and "return" directions of transmission, unless stated otherwise. 4. The term *digital path* is sometimes used to describe one or more digital links connected in tandem, especially between equipment at which the signals of the specified rate originate and terminate.

(COM) 1007-1991



ignored conductor

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image converter

**ignored conductor** See: isolated conductor.

**IH** See: intermediate hub.

**ihandle** A cell-sized datum identifying a particular package instance. (BA/C) 1275-1994

**IL** See: integrated injection logic.

**IITRAN** A programming language similar to PL/I; designed for use as an educational tool. (C) 610.13-1993

**ILD** See: injection laser diode.

**illegal character** A character or combination of bits that is not valid according to some criteria; for example, a character that is not a member of some specified alphabet. *Synonyms*: forbidden character; improper character. *Contrast*: forbidden combination. (C) 610.5-1990

**Illegal Command (ILC) bit** A bit in the Bus Error register of all S-modules. An S-module sets this bit to indicate that the module has received an illegal command. (C/TT) 1149.5-1995

**Illegal Port Selected (IPS) bit** A bit in the Bus Error register of all S-modules. An S-module sets this bit to indicate that the module has received a command addressed to an unsupported port. (C/TT) 1149.5-1995

**illuminance** The unit density of light flux (lm/unit area) that is incident on a surface. (IA) 241-1990

**illuminance,  $E = d\Phi/dA$  (illuminating engineering)** The density of the luminous flux incident at a point on a surface. Average illuminance is the quotient of the luminous flux incident on a surface by the area of the surface. (EEC/IE) [126]

**illuminance (footcandle or lux) meter (1) (illuminating engineering)** An instrument for measuring illuminance on a plane. Instruments that accurately respond to more than one spectral distribution are color corrected; that is, the spectral response is balanced to  $V(\lambda)$  or  $V'(\lambda)$ . Instruments that accurately respond to more than one spatial distribution of incident flux are cosine corrected; that is, the response to a source of unit luminous intensity, illuminating the detector from a fixed distance and from different directions decreases as the cosine of the angle between the incident direction and the normal to the detector surface. The instrument is comprised of some form of photodetector with or without a filter driving a digital or analog readout through appropriate circuitry. (EEC/IE) [126]

(2) (television) See also: illumination. (BT) 201-1979w

**illumination\* (1) (illuminating engineering)** An alternate, but deprecated, term for illuminance. It is frequently used since illuminance is subject to confusion with luminance and illuminants, especially when not clearly pronounced. *Note*: The term illumination also is commonly used in a qualitative or general sense to designate the act of illuminating or the state of being illuminated. Usually the context will indicate which meaning is intended, but occasionally it is desirable to use the expression level of illumination to indicate that the quantitative meaning is intended. (EEC/IE) [126]

(2) (A) (television) (general) The density of the luminous flux incident on a surface; it is the quotient of the luminous flux by the area of the surface when the latter is uniformly illuminated. (B) (television) (at a point of a surface) The quotient of the luminous flux incident on an infinitesimal element of surface containing the point under consideration by the area of that element. *Notes*: 1. The term illumination also is commonly used in a qualitative or general sense to designate the act of illuminating or the state of being illuminated. Usually the context will indicate which meaning is intended, but occasionally it is desirable to use the expression level of illumination to indicate that the quantitative meaning is intended. The term illuminance, which sometimes is used in place of illumination, is subject to confusion with luminance and illuminates, especially when not clearly pronounced. 2. The units of measurements are: footcandle (lumen per square foot, lm/ft<sup>2</sup> lux (lumen per square meter, lx or lm/m<sup>2</sup>). This unit of illumination is recommended by the IEC phot

(lumen per square centimeter, lm/cm<sup>2</sup>).

(BT/ED) [127], 201-1979w

(3) See also: aperture illumination.

\* Deprecated.

**illumination (footcandle) meter** An instrument for measuring the illumination on a surface. *Note*: Most such instruments consist of barrier-layer cells connected to a meter calibrated in footcandles. See also: photometry. (EEC/IE) [126]

**illuminator** A system designed to impose electromagnetic radiation on a designated target so that the reflections can be used by another sensor, typically for purposes of homing. See also: semiactive guidance. (AE) 686-1990w

**illustration** Material that is labeled, numbered, set apart from the main body of text, and, normally, cited within the main text. (C/SE) 1063-1987r

**illustrative diagram** A diagram whose principal purpose is to show the operating principle of a device or group of devices without necessarily showing actual connections or circuits. Illustrative diagrams may use pictures or symbols to illustrate or represent devices or their elements. Illustrative diagrams may be made of electric, hydraulic, pneumatic, and combination systems. They are applicable chiefly to instruction books, descriptive folders, or other media whose purpose is to explain or instruct. See also: control. (IA) [60], 270-1966w

**ILS** See: instrument landing system.

**ILS reference point** A point on the centerline of the ILS runway designated as the optimum point of contact for landing; in International Civil Aviation Organization standards this point is from 150 to 300 meters (500 to 1000 feet) from the approach end of the runway. (AE) 686-1982s

**image (1) (optoelectronic device)** A spatial distribution of a physical property, such as radiation, electric charge, conductivity, or reflectivity, mapped from another distribution of either the same or another physical property. *Note*: The mapping process may be carried out by a flux of photons, electric charges, or other means. See also: optoelectronic device. (ED) [46]

(2) (computer graphics) A displayed or drawn representation. (C) 610.6-1991

(3) (image processing and pattern recognition) A two-dimensional representation of a scene. *Synonym*: picture. See also: digital image. (C) 610.4-1990

(4) (A) In image processing, a two-dimensional representation of a scene. (B) In graphics, a displayed or drawn representation. (C) 610.10-1994

(5) See also: card image.

**Image** The data structure contained in the Load Server that the Loadable Device wishes to load. (C/LM) 15802-4-1994

**image analysis** The process of describing or evaluating an image in terms of its parts, properties, and relationships. (C) 610.4-1990

**image antenna** The imaginary counterpart of an actual antenna, assumed for mathematical purposes to be located below the surface of the ground and symmetrical with the actual antenna above ground. See also: antenna. (AP) [35]

**image area** In micrographics, that part of the film frame reserved for an image. (C) 610.2-1987

**image attenuation** The real part of the image transfer constant. See also: image transfer constant. (CAS) [13]

**image burn** See: retained image.

**image camera tube** See: image tube.

**image compression** The process of eliminating redundancy or approximating an image in order to represent the image in a more compact manner. See also: adaptive coding; contour encoding; interframe coding; lossless encoding; predictive coding; run length encoding. (C) 610.4-1990

**image converter (solid state)** An optoelectronic device capable of changing the spectral characteristics of a radiant image. *Note*: Examples of such changes are infrared to visible and x ray to visible. See also: optoelectronic device. (ED) [46]



P.1

**P.I** See: control action, proportional plus integral.**PI** See: processor interface.**pick device (1)** A logical input device used to select a display element on a display surface. A typical physical device is a light pen. *See also:* sonic pen. (C) 610.6-1991**(2)** An input device that is used to specify or detect a particular display element or segment. *Contrast:* pointing device. *See also:* electronic pen; light pen. (C) 610.10-1994**pickle (electroplating)** A solution or process used to loosen or remove corrosion products such as oxides, scale, and tarnish from a metal. *See also:* electroplating. (IA) [59]**pickling (A) (chemical) (electroplating)** The removal of oxides or other compounds from a metal surface by means of a solution that acts chemically upon the compounds. **(B) (electrolytic)** Pickling during which a current is passed through the pickling solution to the metal (cathodic pickling) or from the metal (anodic pickling). *See also:* electroplating. (EEC/PE) [119]**pickoff (1) (test, measurement, and diagnostic equipment)** A sensing device that responds to movement to create a signal or to effect some type of control. (MIL) [2]**(2) (accelerometer) (gyros)** A device that produces an output signal as a function of the relative linear or angular displacement between two elements. (AE) 528-1994**pickoff axis (dynamically tuned gyro) (inertial sensors)** The axis of angular displacement between the rotor and the case that results in the maximum signal per unit of rotation from the pickoff. (AE) 528-1994**pickoff offset (dynamically tuned gyro)** The difference in angular rotor position between operation at pickoff electrical null and at gyro operating null. (AE) 528-1994**pickup (1) (electronics)** A device that converts a sound, scene, or other form of intelligence into corresponding electric signals (for example, a microphone, a television camera, or a phonograph pickup). *See also:* microphone; phonograph pickup; television. (BT/MIL) [2], [34]**(2) (of a relay)** The action of a relay as it makes designated response to progressive increase of input. As a qualifying term, the state of a relay when all response to progressive increase of input has been completed. Also used to identify the minimum value of an input quantity reached by progressive increases that will cause the relay to reach the pickup state from reset. *Note:* In describing the performance of relays having multiple inputs, pickup has been used to denote contact operation, in which case pickup value of any input is meaningful only when related to all other inputs. (PE/SWG) C37.100-1992**pickup and seal voltage (magnetically operated device)** The minimum voltage at which the device moves from its de-energized into its fully energized position. (IA) 74-1958w**pickup current** *See:* pickup value.**pickup factor, direction-finder antenna system** An index of merit expressed as the voltage across the receiver input impedance divided by the signal field strength to which the antenna system is exposed, the direction of arrival and polarization of the wave being such as to give maximum response. *See also:* navigation. (AE) [42], 172-1983w, 173-1959w, 686-1982s**pickup spectral characteristic (color television)** The set of spectral responses of the device, including the optical parts, that converts radiation to electric signals, as measured at the output terminals of the pickup tubes. *Note:* Because of non-linearity, the spectral characteristics of some kinds of pickup tubes depend upon the magnitude of radiance used in the measurement. (BT) 201-1979w**pickup tube** *See:* camera tube.**pickup value** The minimum input that will cause a device to complete contact operation or similar designated action. *Note:* In describing the performance of devices having multiple inputs, the pickup value of an input is meaningful only when related to all other inputs. (PE/SWG) C37.100-1981s

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picture transmission

**pickup voltage (magnetically operated device)** (or current) The voltage (or current) at which the device starts to operate when its operating coil is energized under conditions of normal operating temperature. *See also:* contactor. (IA/VT) [60], 16-1955w**pico (mathematics of computing)** A prefix indicating  $10^{-12}$ . (C) 1084-1986w**PICS** *See:* protocol implementation conformance statement.**PICT** A standard electronic format for exchanging graphical information. (ATL) 1232-1995**pictorial format (pulse measurement)** A graph, plot, or display in which a waveform is presented for observation or analysis. Any of the waveform formats defined in the following subsections may be presented in the pictorial format. (IM) 181-1977w**pictorial pattern recognition** The recognition of patterns in visual or pictorial data. (C) 610.4-1999**picture** *See:* image.**picture data (data management)** Data that are associated with a picture specification. *Synonym:* pictured data. *See also:* binary picture data; decimal picture data. (C) 610.5-1999**pictured data** *See:* picture data.**picture element (1) (pixel)** The smallest area of a television picture capable of being delineated by an electric signal passed through the system or part thereof. *Note:* It has three important properties, namely:  $P_v$ , the vertical height of the picture element;  $P_h$ , the horizontal length of the picture element; and  $P_a$ , the aspect ratio of the picture element. In addition,  $N_p$ , the total number of picture elements in a complete picture, is of interest since this number provides a convenient way of comparing systems. For convenience,  $P_v$  and  $P_h$  are normalized for  $V$ , the vertical height of the picture; that is,  $P_v$  or  $P_h$  must be multiplied by  $V$  to obtain the actual dimension in a particular picture.  $P_v$  is defined as  $P_v = 1/N$ , where  $N$  is the number of active scanning lines in the raster.  $P_h$  is defined as  $P_h = t_r A / t_e$ , where  $t_r$  is the average value of the rise and delay times (10 percent to 90 percent) of the most rapid transition that can pass through the system or part thereof,  $t_e$  is the duration of the part of a scanning line that carries picture information, and  $A$  is the aspect ratio of the picture. (At present all broadcast television systems have a horizontal to vertical aspect ratio of 4/3.)  $P_a$  is defined as  $P_a = P_h / P_v = t_r A N / t_e$  and  $N_p$  is defined as  $N_p = (1/P_v) \times (A/P_h) = N t_e / T_r$ . *See also:* television. (BT) [33]**(2) (computer graphics) (image processing and pattern recognition)** *See also:* pixel. (C) 610.4-1990, 610.6-1991**picture frequencies (facsimile)** The frequencies which result solely from scanning subject copy. *Note:* This does not include frequencies that are part of a modulated carrier signal. *See also:* scanning. (COM) 168-1956w**picture inversion (facsimile)** A process that causes reversal of the black and white shades of the recorded copy. *See also:* facsimile transmission. (COM) 168-1956w**picture processing** *See:* image processing.**picture signal (television or facsimile)** The signal resulting from the scanning process. *See also:* television. (BT) [34]**picture specification** A character-by-character description of the composition and characteristics of the representation of some data item; for example, the picture S99V999 ( $S$  = sign character; 9 = decimal digit character;  $V$  = radix point character) may be used to describe the following items, resulting in the picture data as indicated:

value	picture data
.06	+00.060
-10.342	-10.342
3	+03.000

(C) 610.5-1980

**picture transmission (telephotography)** The electric transmission of a picture having a gradation of shade values. (EEC/PE) [119]